Claims:

1. A system for modifying the vibration of at least one string of a multi-stringed instrument in response to preselected player techniques involving selected characteristic features of the string's motion comprising:

a) at least one transducer for providing a sensing output signal in accordance with the motion of the string and for effecting a change of the motion of the string in accordance with an actuating signal; and

b) a supervisor for storing the output signals to provide a history of the string motion, for extracting features of the stored signals and for reviewing the extracted features in light of said selected characteristic features to recognize the occurrence of one or more preselected player techniques; and

c) a controller responsive to the recognition of one or more preselected player techniques for applying an actuating signal to the transducer to modify the string's motion in accordance with the recognized technique(s).

2. The system of claim 1 wherein said at least one transducer comprises at least one sensing/actuating transducer arranged to produce the sensing output signal and respond to the actuating signal during separate portions of successive time frames.

3. The system of claim 1 wherein a motion of the string undergoing vibrato is one of the preselected player techniques.

4. The system of claim 3 wherein the supervisor/controller is arranged to apply an actuating signal which causes the string to sustain the sensed motion in accordance with the magnitude of the vibrato.

5. The system of claim 2 wherein the rate at which the string motion is undergoing vibrato is one of the preselected player techniques.

6. The system of claim 1 wherein a motion of the string undergoing glissando is one of the preselected player techniques.

7. The system of claim 2 wherein a motion of the string undergoing glissando is one of the preselected player techniques.

8. The system of claim 1 wherein a motion of the string creating a new note is one of the preselected player techniques.

9. The system of claim 2 wherein a motion of the string creating a new note is one of the preselected player techniques.

10. The system of claim 1 wherein the motion of the string creating a new note of a selected amplitude is one of the preselected player techniques.

11. The system of claim 2 wherein the motion of the string creating a new note of a selected amplitude is one of the preselected player techniques.

12. The system of claim 1 wherein the motion of the string creating a new note having a given spectrum is one of the preselected player techniques.

13. The system of claim 2 wherein the motion of the string creating a new note having a given spectrum is one of the preselected player techniques.

14. The system of claim 1 wherein one of the motions of the string creating a given harmonic balance of a new note is one of the preselected player techniques.

15. The system of claim 2 wherein motion of the string creating a given harmonic balance of a new note is one of the preselected player techniques.

16. The system of claim 1 wherein the motion of the string creating a given series of new notes is one of the preselected player techniques.

17. The system of claim 2 wherein the motion of the string creating a given series of new notes is one of the preselected player techniques.

18. The system of claim 1 wherein the controller is further responsive to a reference signal that prescribes the desired state of motion of the string.

19. The system of claim 2 wherein the controller is further responsive to a reference signal that prescribes the desired state of motion of the string.

20. The system of claim 18 wherein the reference signal is in the form of a time domain signal.

21. The system of claim 19 wherein the reference signal is in the form of a time domain signal.

22. The system of claim 18 wherein the reference signal is in the form of a frequency domain signal.

23. The system of claim 19 wherein the reference signal is in the form of a frequency domain signal.

24. The system of claim 2 wherein the actuating signal is a correction signal for reducing the deviation of the string's motion from the desired motion.

25. The system of claim 2 wherein said at least one transducer comprises a pair of sensing/actuating transducers orthogonally oriented with respect to the string.

26. The system of claim 1 wherein the supervisor tests the extracted features against a set of pattern matching rules representative of string motion associated with the preselected player techniques.

27. The system of claim 2 wherein the supervisor tests the extracted features against a set of pattern matching rules representative of string motion associated with the preselected player techniques.

28. The system of claim 1 wherein the supervisor generates one or more control signals in response to the recognized player techniques and wherein the controller is responsive to the control signal(s).

29. The system of claim 2 wherein the supervisor generates one or more control signals in response to the recognized player techniques and wherein the controller is responsive to the control signal(s).

30. The systems of claim 28 or 29 wherein the supervisor is further arranged to store signals representative of a plurality of instrument definitions in the form of command phrases each individual definition prescribing a separate behavior of the instrument through the application of control signals to the controller and further including a manually operable instrument selection definition control and wherein the supervisor in response to the actuation of said control is arranged to recognize the occurrence of characteristic string features constituting a common phrase and change the instrument definition.

31. The system of claim 2 further including a mixer, coupled to the supervisor, for providing an output signal in accordance with the sensed and control signals.

32. The system of claim 31 further including an audio amplifier responsive to the mixer output signal.

33. A method of recognizing preselected player techniques in playing a stringed instrument and utilizing such recognized techniques as a means to modify the operation of the instrument in which the preselected techniques involve selected characteristic features of string motion with each string having at least one associated transducer coupled thereto for

providing sensing output signals in accordance with the string motion and for effecting a change in the string motion in response to actuating signals comprising:

storing the transducer output signals associated with each string and extracting features therefrom;

reviewing the extracted features to determine when said features substantially correspond to one or more preselected player techniques; and

in response to the recognition of a player technique(s) applying actuating signals to at least one of said transducers to modify the motion of said string(s).

34. The method of claim 33 wherein the reviewing step includes providing a set of pattern matching rules representative of features of string motion associated with the preselected player techniques and testing the extracted features against said set of rules.

35. The method of claim 33 wherein the preselected player techniques include one or more techniques in the form of vibrato, glissando, plucking a new note of a selected amplitude, the spectrum of a new note, the harmonic balance of a new note, and a series of notes.

36. The method of claim 35 including applying actuating signals to selected transducers to sustain the vibration of selected harmonics of certain strings while dampening other harmonics in response to a selected player technique.

37. The method of claim 35 including storing selected time domain waveform reference signals and applying actuating signals to one or more transducers in accordance with the time domain reference signals in response to a selected player technique.

38. The method of claim 35 including storing selected frequency domain reference signals and applying actuating signals to one or more transducers in accordance with the frequency domain reference signals in response to a selected player technique.

39. The method of claim 38 including storing selected time domain reference signals and applying actuating signals and one more transducer in accordance with the time and frequency domain reference signals in response to a selected player technique.

40. The method of claim 35 including applying actuating signals to one or more strings to dampen selected sympathetic vibrations on unplayed strings to silence unwanted sounds in response to a selected player technique.

41. The method of claim 35 applying actuating signals to one or more transducers to

excite vibration in the associated strings in response to a selected player technique.

42. The method of claim 35 including applying actuating signals to one or more transducers to substantially prohibit the vibration of the associated strings in response to a selected player technique.

43. The method of claim 35 wherein a preselected player technique comprises recognizing the rate of vibrato.

44. The method of claim 35 including applying actuating signals to one or more strings in accordance with the magnitude of vibrato technique to control the intensity of the sustained effect of selected strings.

45. The method of claim 44 including applying actuating signals to one or more springs in response to the glissando player technique to control the timber created by one or more selected strings.

46. A system for modifying the vibration of the strings of a multi-stringed instrument in response to preselected player techniques involving selected characteristics features of the motion of one or more strings comprising:

at least one sensing/actuating transducer coupled to each string, the transducer being arranged to produce a sensing output signal in accordance with the motion of the string and to effect a change in the string motion in accordance with an actuating signal, the sensing and actuating signals occurring during separate portions of successive time frames;

a supervisory system including a memory and processor for storing the sensed signals, extracting features therefrom, reviewing the extracted features against a set of pattern matching rules representative of string motion associated with the preselected player techniques and generating a control signal(s) in the event that the extracted features substantially correspond to one or more preselected player techniques; and

a controller responsive to said control signal(s) for applying actuating signals to the transducer to modify the motion of one or more of the strings in accordance with the recognized techniques.

47. The system of claim 46 wherein one or more of the preselected player techniques are selected from vibrato, glissando, reaction of a new note, creation of a new note of a given amplitude, creation of a new note having a given spectrum, creating a new note of a given harmonic balance, and creation of a given series of new notes.

48. The system of claim 47 wherein the memory has stored therein signals representative of a plurality of instrument definitions in the form of command phrases with each individual definition prescribing a separate behavior of the instrument through the application of control signals to the controller and further including a manually operable instrument selection control and wherein the supervisor, in response to the actuation of said control, is arranged to recognize the occurrence of characteristic string features constituting a command phrase and change the instrument definition.

49. A system for modifying the vibration of at least one string of a multi-stringed instrument having:

a) at least one transducer for providing a sensing output signal in accordance with the motion of the string and for effecting a change of the motion of the string in accordance with an actuating signal;

b) a manual control area responsive to finger position along a first and second axis and providing first and second manual input control signal indicative of said finger position;

c) a supervisor responsive to said manual input control signals causing a first axis control signal to select between string or harmonics and the second axis to govern the amount of sustain and damping and producing control system command signals according; and

c) a controller responsive to said control system command signals for applying an actuating signal to the transducer to modify the string's motion in accordance with finger positions.

50. The system of claim 1 wherein the supervisor is further programmed to tune the controller to align the frequency and phase of actuating signals to the frequency and phase of the string motional harmonics to provide selective control of both sustain and damping of string harmonics.